

REMARKS

The Office Action dated November 10, 2005 has been received and carefully noted. The above amendments to the claims, and the following remarks, are submitted as a full and complete response to the Office Action.

Claims 1-20 are respectfully submitted for consideration.

The Office Action rejected claims 1-20 under 35 U.S.C. 103(a) as being obvious over US Patent No. 6,108,558 to Vanderspool (Vanderspool) in view of US Publication No 2003/0125046 to Riley (Riley). The Office Action took the position that Vanderspool disclosed all of the features of the pending claims except the feature of analyzing the measurements to identify suspicious measurements. The Office Action asserted that Riley disclosed this feature. Applicants submit that the cited references taken individually or in combination, fail to disclose or suggest all of the features recited in any of the pending claims.

Claim 1, from which claim 2 depends, recites a method of providing information regarding a location of a mobile user of a communication system. The method includes performing measurements for provision of input data for a location calculation function, and analyzing an effect of ignoring a measurement, to identify suspicious measurements. The method further includes deciding selected measurements for use by the location calculation function, and calculating a location estimate for a mobile user based on the selected measurements.

Claim 3, from which claim 4 depends, recites a communication system. The communication system includes a measuring device configured to perform measurements for provision of input data for a location calculation function. The communication system further includes an analyzer configured to analyze an effect of ignoring a measurement to identify suspicious measurements, and a deciding unit configured to decide selected measurements for use by the location calculation function. Still further the communication system includes a calculating device configured to calculate a location estimate for a mobile user based on the selected measurements.

Claim 5, from which claim 6 depends, recites a communication system. The communication system includes measuring means for performing measurements for provision of input data for a location calculation function. The communication system further includes analyzing means for analyzing an effect of ignoring a measurement, to identify suspicious measurements, a deciding means for deciding selected measurements for use by the location calculation function, and a calculating means for calculating a location estimate for a mobile user based on the selected measurements.

Claim 7, from which claims 8-11 depend, recites a location system. The location system includes a controller configured to control at least one base station, a location service node configured to provide a client application with a measurement regarding geographic location information of at least one mobile station. The location system further includes an interface configured to receive the measurement regarding the geographic location information of the at least one mobile station and to transmit the

measurement regarding the geographic location information to a location device, and the location device configured to determine a location estimate based upon the measurement regarding the geographic location. Further, the location system includes a suspicious measurement identifier configured to identify suspicious measurements by analyzing a discrepancy between the measurement and the location estimate.

Claim 12, from which claims 13-16 depend, recites a method for providing location information to a user in a communication system. The method includes controlling at least one base station, and providing a client application with a measurement regarding geographic location information of at least one mobile station. The method further includes receiving the measurement of the geographic location information of the at least one mobile station, and transmitting the measurement of the geographic location information to a location means for providing location services. Further, the method includes determining a location estimate based upon the measurement regarding the geographic location, and identifying suspicious measurements by analyzing a discrepancy between the measurement and the location estimate.

Claim 17, from which claims 18-20 depend, recites a location system. The location system includes controlling means for controlling at least one base station, and a first providing means for providing a client application with a measurement regarding geographic location information of at least one mobile station. The location system further includes receiving means for receiving the measurement regarding the geographic

location information of the at least one mobile station, and transmitting means for transmitting the measurement regarding the geographic location information to a location means for location services. The method further includes determining means for determining a location estimate based upon the measurement regarding the geographic location, and identifying means for identifying suspicious measurements by analyzing a discrepancy between the measurement and the location estimate.

The present invention relates to detecting suspicious (or erroneous) measurements which are out of line with the other location measurements in order to reduce the overall inaccuracy of a location calculation. Accordingly, outlying measurements which are inconsistent with more consistent measurements can be eliminated entirely from the calculation. See at least paragraphs [0044] – [0047] of the present application.

Further, as explained at least in paragraph [0039] of the present application, the location estimates may be provided by processing location information derived from various sources. Thus, a number of different measurements, possibly obtained by different location determination techniques, may be combined in making a location estimate, (see at least paragraph [0043] of the present application). One of the many objects of the present invention is to improve the accuracy of location calculations by identifying suspicious measurement results before the final calculations of the location estimate (see at least paragraph [0045] of the present application). In other words, certain inaccurate measurements are not used in the final location estimate calculation, in order to improve the accuracy of the calculation (see at least paragraph [0046] of the present

application). According to the present invention the above is accomplished by analyzing a discrepancy between measurements and an obtained location estimate, in other words, by analyzing the effect of ignoring a measurement. For example, the location calculation unit may be used to remove the measurements one at a time, and calculate a location estimate and associated confidence area with the remaining measurements. A discrepancy value can be calculated which gives an indication of the discrepancy between the measurement and the obtained location estimates (see at least paragraph [0049] of the present application).

Thus, the present invention is based upon analyzing the effect of ignoring a measurement, or analyzing a discrepancy between a measurement and a location estimate, in order to identify suspicious measurements which are then not used in the subsequent location calculations for the mobile unit.

Applicants respectfully submit that the cited references taken individually or in combination fail to disclose or suggest all of the features recited in any of the above claims.

Vanderspool is directed to a method for calculating a location of a remote unit utilizing observed time difference (OTD) and real time difference (RTD) measurements. Observed differences in received signal times are reported to a Mobile Location Center (MLC). In addition, a Real-Time difference (RTD) between base stations is computed a second time and reported to the MLC. A corrected Time Difference of Arrival (TDOA) is computed based on the OTD measurements and the estimated RTD measurements.

The Office Action admits that Vanderspool has deficiencies as prior art against the present pending claims and relies on Riley to cure the admitted deficiencies.

Riley is directed to a use of mobile stations for determination of base station location parameters in a wireless mobile communication system. Figures 7-9 of Riley illustrate a flow diagram showing how the position and time offset of a base station is determined from a number of mobile station positions, mobile station offsets and pseudo-ranges between the base station and the mobile station positions. Riley as discussed above, is relied upon in the Office Action to cure the admitted deficiencies of Vanderspool, such as analyzing the measurements to identify suspicious measurements, deciding selected measurements for use by the location calculation function, and calculating a location estimate for a mobile user based on the selected measurements.

Applicants respectfully submit that the cited references taken individually or in combination, fail to disclose or suggest at least the feature of analyzing the effect of ignoring a measurement to identify suspicious measurements, as recited in claim 1 and similarly recited in claims 3, 5, 7, 12 and 17, because Riley fails to cure the admitted deficiencies of Vanderspool.

Riley merely relates to a method in which mobile stations are used to determine the location parameters of a base station. Thus, Riley fails to disclose a method for determining the location of a mobile user, as recited in claims 1, 3, 5, 7, 12 and 17, but instead discloses determining the location of a base station (see paragraphs [0009] to [0012] of Riley).

Further, Applicants respectfully submit that the cited references taken individually or in combination, fail to disclose or suggest the feature of identifying suspicious measurements which may then be excluded from a location calculation, as recited in claim 1 and similarly recited in claims 3, 7, 12 and 17. The Office Action admitted that Vanderspool fails to disclose this feature. The method in Riley does not disclose or suggest a determination of whether particular measurements may be erroneous, i.e., suspicious, but merely whether the previously determined position of the base station is correct or not. Thus, there is no suggestion in Riley that calculations are performed in order to provide a location estimate with each of the remaining measurements, as recited in the pending claims.

Furthermore, Applicants respectfully submit that the cited references taken individually or in combination, fail to disclose or suggest the feature of selecting any particular measurements for calculating a location measurement of a mobile user (underline added). The Office Action admits that Vanderspool fails to disclose this feature. Riley merely relates to a method in which mobile stations are used to determine the location parameters of a base station. Thus, Riley fails to disclose a method for determining the location of a mobile user, as recited in claims 1, 3, 5, 7, 12 and 17, but the location of a base station (see paragraphs [0009] to [0012] of Riley).

The following paragraphs further evidence that Riley fails to cure the admitted deficiencies of Vanderspool.

The method of Riley uses determinations of the distance between the base station and the mobile station to check the position of the base station. When this distance is inconsistent with base station location information in a database, the database may be modified to include corrected base station location information. In this fashion it is possible to find erroneous base station information and discontinue its use for position location services before the correct location of the base station becomes known (see paragraph [0013] of Riley).

Paragraph [0014] of Riley explains that erroneous base station location information can be corrected automatically once a sufficient number of independent distances are determined between the base station and mobile stations having known positions. In other words, once a number of distance measurements between the base station and mobile stations have been made, the mobile stations having independently confirmed known locations, if all these measurements indicate that the previously listed location of the base station in a database is incorrect, the location of the base station in a database can be updated.

Paragraphs [0065] and [0071] of Riley merely explain that particular measurements may have errors associated with them. Paragraph [0080] refers to Figure 8 and explains that there must be sufficient measurements from various base stations available in order to determine the position of the base station.

Referring to Figure 9 of Riley, paragraph [0083] explains how the network computes the distance between the mobile station and the base station from known

positions, and compares the distance to the pseudo-range measurement. If the distance is inconsistent with the pseudo-range measurement, the system records the possibility that the base station position is erroneous. If a number of such inconsistencies are recorded, an error threshold is reached and the system records that the base station position is unknown.

Based at least on the above, Applicants respectfully submit that that the system disclosed in Riley does not cure the admitted deficiencies of Vanderpool because Riley does not involve analyzing an effect of ignoring a measurement, to identify suspicious measurements which may then be excluded from a location calculation, as recited in the pending claims. The method of Riley does not involve attempting to determine whether particular measurements may be erroneous, but merely whether the previously determined position of the base station is correct or not. Thus, there is no suggestion in Riley that calculations are performed omitting one measurement at a time, in order to provide a location estimate with each of the remaining measurements. Furthermore, Riley does not disclose selecting any particular measurements for calculating a location estimate of the mobile user, as recited in the pending claims. As discussed above, the outcome of Figure 9 is either that the base station is recorded as unknown, if the error threshold is reached, or the position of the base station location estimate is improved.

Applicants further note the Office Action's suggestion on page 2 of the Office Action that Riley teaches ignoring or throwing out particular values when the error threshold is reached. The Office Action gives an apparent example that if the threshold is

set as a value number from 1 to 10, then the number 25 (if it appears as a measurement) will be ignored.

We note first of all that this apparent example mentioned in the Office Action does not appear anywhere in Riley. Moreover, it appears that this is not what Riley is teaching. Thus, it appears that the Office Action is improperly reading features into Riley.

The error threshold relates to a situation which arises when a certain number of inconsistencies between known distances and the pseudo-orange measurement is reached. The consequence of this is not that certain measurements are discarded, but that the position of the base station is recorded as unknown. Thus, Riley does not disclose the feature referred to in claim 1.

Applicants further submit that there is no motivation to combine the teachings of Riley to cure the deficiencies of Vanderspoo.

In order to establish a case of prima facie obviousness there must be some suggestion in the references themselves or in knowledge generally available to one skilled in the art to combine the teachings of the references. In re Vaack, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

The method of Riley relates to a method for determining the location of a base station, and not of a mobile user. Clearly, the location of a base station is normally fixed, and, therefore, is always a recorded known location, against which to compare the latest determined positions for the base station. In contrast, the location of a mobile station is constantly changing and therefore the only measurements which are worth comparing in

a location calculation are those which have only just been made. Thus, whatever Riley discloses about comparing recent measurements to previously recorded location determinations for a base station, it would not have been clear to a skilled person how to apply this teaching to the entirely separate problem of determining the location of a mobile station. For this reason, one skilled in the art would not be motivated to combine Riley with Vanderspool.

Applicants respectfully submit that because claims 2, 4, 6, 8-11, 13-16 and 18-20 depend from claims 1, 3, 5, 7, 12 and 17, these claims are allowable at least for the same reasons as claims 1, 3, 5, 7, 12 and 17. Further, Applicants respectfully submit that the cited references taken individually or in combination fail to disclose or suggest all of the features of these dependent claims.

Based at least on the above, Applicants respectfully submit that the cited references taken individually or in combination, fail to disclose or suggest all of the features recited in any of the pending claims. Accordingly, Applicants respectfully request withdrawal of the rejection of claims 1-20 under 35 U.S.C 103(a).

CONCLUSION

Applicants respectfully submit that each of claims 1-20 recite features that are neither disclosed nor suggested in any of the cited references. Accordingly, Applicants

respectfully request all of the pending claims be allowed and this application be passed to issued.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, the applicants' undersigned attorney at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

In the event this paper is not being timely filed, the applicants respectfully petition for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 50-2222.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'D. E. Brown', written over a horizontal line.

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